ISD Software Management Plan / Product Plan (SMP/PP) For Class D and E Software

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Approved By: (signature)
Name: Joe Hennessy
Title: Chief, ISD

Responsible Office: 580/Information Systems Division (ISD)	**Asset Type:** Template
Title: SMP/PP for Class D and E Software	**PAL Number:** 1.2.6.3

Purpose

The purpose of this document is to provide a template for use in producing a SMP/PP for class D and E mission software as defined in NPR 7150.2, NASA Software Engineering Requirements. The template is a skeleton SMP/PP intended for use by *ISD* personnel as the basis for a software project-specific SMP/PP.

Scope

All ISD software of class type D and E, as defined in NPR 7150.2. The NPR can be found at http://nodis.hq.nasa.gov/

Class D: Analysis and Distribution Software
Class E: Development Support Software

Style Conventions

Text within the template that appears in this (style name = "Normal") style is equally applicable to all SMP/PPs and should be included without modification. All document section headings should also be included without modification, although their style names vary depending on outline level.

Text in this style [style name = "TAILORING ADVICE"] within the template is advice on how to tailor the information in any specific section. As the plan is developed, the generic [TAILORING ADVICE] text should be replaced with material that applies to the specific software project, or deleted if it is general advice.

General Tailoring Conventions

All components of the SMP/PP table of contents should be addressed, but the level of detail is left up to the Team based on software complexity and the customer's needs and expectations. The length and level of detail of the SMP/PP should be commensurate with the scope and complexity of the project. Section headings may be added where necessary, but existing headings should not be modified or deleted. If a particular section is not applicable to the specific SMP/PP under production, that fact should be noted under the section heading, together with a brief explanation.

Some items of the table of contents are processes that must be included in the SMP/PP by reference to approved processes contained in the GSFC Process Asset Library at http://software.gsfc.nasa.gov/, or by direct inclusion in the SMP/PP. If new processes are included in the Plan, they must meet the criteria for each specific process specified in Appendix B of the Product Development Handbook.

The following disclaimer appears on all pages of the template: "Printed copies of this document are for REFERENCE PURPOSES ONLY! The only controlled copy of this document is located on-line at http://xxx.yyy.zzz". This disclaimer should be modified to contain the appropriate URL, but should not be removed.

Finally, in the target Plan, this entire section (Document Header, "Purpose", "Scope", "Style Conventions", "General Tailoring Guidelines", and "Change History") should be deleted.

Change History

Version	Date	Description of Improvements
1.0	June 1, 2005	Initial approved version by CCB

[*Name of Code xxx*] Branch
(NASA GSFC Code 58x)

[*Mission Name (Acronym)*, if applicable]

[*Software Project Name (Acronym)*]

Software Management Plan / Product Plan

SMP/PP Version: [*xx*]

SMP/PP Date: [*yy*]

Software Manager: [*Software Manager Name*]

SIGNATURES

Prepared by:

_____ _____

Aaa A. Aaaaa/58x Date
[*Software Project Name*] Product Development Lead

Approved by:

_____ _____

Aaa A. Aaaaa Date
Customer Representative

_____ _____

Aaa A. Aaaaa /58x Date
[*Branch Name*] Branch/Head

PLAN UPDATE HISTORY

[This table shows the update history for the SMP/PP. Insert version designations, dates, and descriptions for the various version of this SMP/PP, along with the listed page numbers of pages changed for each version.]

Version	Date	Description	Affected Pages
		.	

TABLE of CONTENTS

[Add any project-specific sections to this table of contents.]

1.0 Introduction

This document is the Software Management Plan/Product Plan (SMP/PP) for development of the [*software project acronym*] system.

The major goals for this document are:

(1) To describe **what** products will be delivered as the [*software project acronym*] system.

(2) To define **who** is responsible for producing the products.

(3) To describe the baseline **schedule** for completing the effort.

(4) To specify the **cost** of producing the software, as a function of time.

(5) To describe **how** and **where** the work will be carried out.

(6) To reach a mutual understanding and agreement with our customer and other stakeholders on items (1) through (5).

[*Use the paragraph above as is, or add project-specific information about the purpose of this plan.*]

This plan is the ISO quality planning document for producing the [*software project acronym*] system.

1.1 Background

[Include a brief description of what larger effort/activity this Product Development Team (PDT) is supporting (e.g., high level overview of the mission) and how this product fits into the larger picture. This should provide a context for the more detailed material to follow.]

1.2 Document Organization

Section 1 of this document presents introductory material and an overview of the software system to be developed.

Section 2 (Customer Agreement) summarizes the requirements, deliverables, and other mutually agreed aspects of the relationship between the customer and the software project.

Section 3 (Software Management Approach) describes how the development process will be managed.

Section 4 (Software Technical Approach) describes the technical approach to developing, delivering, and maintaining the software products.

Appendix A (Acronyms) defines the acronyms and abbreviations used in this document.

2.0 Customer Agreement

This section describes the *[software project acronym]* Product Development Team's (PDT) understanding of the products to be developed, the schedule for development, the resources required, and mechanisms for communicating with the customer. The purpose of this section is to expose these items to the customer as a means of negotiating and documenting a mutual understanding. The customer's signature on the signature page indicates agreement with this section.

2.1 Customer Identification

[Identify the primary customer for the software to be developed. Normally, this will be the Project or other organization that is providing funding for the development effort, has specified the requirements, and will be responsible for accepting the final software. In most cases more than one organization may be involved in addition to the Project customer.]

2.2 Customer Goals and Objectives

[List the primary customer's goals and objectives for the software to be developed. Essentially this amounts to a very high-level statement of the major requirements, probably no more than one or two paragraphs.]

[List any special things that the customer wants the PDT to accomplish (e.g., rapid turn around, new architecture, special COTS requirements, special experiments, etc.). This may include long term goals for research and development projects.]

2.3 Customer Requirements

[This section should reference the high-level requirements specified by the customer, and should include any customer-specified standards to be met or interface control documents needed. If a reference is not available, then list these items here. Do not include derived technical interface documents or databases here; reference them in Section 4.1.]

2.4 Customer Schedules

[This section should reference customer-specified schedule requirements, including such items as documentation, releases and reviews. If a reference is not available, then list these items here.]

2.5 Customer Deliverables

[List the customer-specified products to be delivered for each phase of development, including software, hardware, licenses, documentation, etc. List any customer-specified delivery medium and method of delivery for all products listed. List any customer-specified product delivery destinations for all products listed.]

Deliverables by Phase	Medium/Method of Delivery	Delivery Destination

2.6 Customer Acceptance Criteria

[This section should reference the customer's criteria for determining when the product is completed (e.g., "When will the customer accept the product?"). This is usually demonstrated by having a satisfactorily completed test matrix/set of test plans. The customer's verbal acceptance is not sufficient. If a reference is not available, then list these items here.]

2.7 Customer Training

[Specify who (from customer organization) is to be trained, how many are to be trained, location and nature of training.]

Customer Training Required	#	Location and Nature of Training

2.8 Customer Requirements for Post-Delivery Maintenance

[Describe maintenance requirements as specified by the customer.]

2.9 Customer-Supplied Elements

[List any technical and resource-related elements supplied by the customer that will be used in the production, testing, packaging or delivery of the product. List both technical and resource related elements. Do not include funding. Include interfaces, delivery schedule, medium of supplied items, and person responsible.]

Customer-Supplied Elements	Medium/Method of Delivery	Delivery Schedule	Person Responsible

2.10 Customer Involvement

[Specify how the customer will be expected to take part in the development process. Typically, the customer will participate in PDT meetings, technical reviews, change control boards, and will provide direction and witness acceptance tests. There may be other forms of direct interaction, such as regular status meetings, participation in working groups, analyst support in software test, etc. Include roles, responsibilities, authority, and accountability.]

2.11 Customer Requirements Review and Update Process

[Describe the process used to evaluate and approve changes to the customer requirements. Be sure to note that the PDT will be evaluating the changes to assure that they have the capability of providing the requested changes within the allotted resources and schedule.

Approval authorities (those listed on the signature page) must be specified by name and title. It must be stated whether or not the approval authorities consist of the CCB. If the approval authority is the CCB, then the CCB process and membership must be described or referenced. If the approval authority is not the CCB, then specify the approval authority and describe or reference its process and membership. The original approval authority must also approve any changes.]

3.0 Software Management Approach

3.1 General Development Approach

[Describe briefly the general philosophy that will be used to build the product, discussing such aspects as use of COTS, contractor involvement, schedule constraints, use of a particular development methodology or new technology, etc.]

3.1.1 Statement of the Problem

[Briefly describe the requirements, the steps to be taken to accomplish the project, and the relation, if any, to other projects.]

3.1.2 Operational Concept

[Briefly describe the current state of operational software for this area, including the pros and cons for current operational systems. Describe how this new operational design will solve these common problems and what benefits can be expected. If the project is to be done in stages, briefly describe the benefits of each stage.]

3.1.3 Collaboration and Technology Transfer

[Describe the focus area and identify all current and potential collaborators for future development. Include plans for software registration, technology transfer, and commercial-ization.]

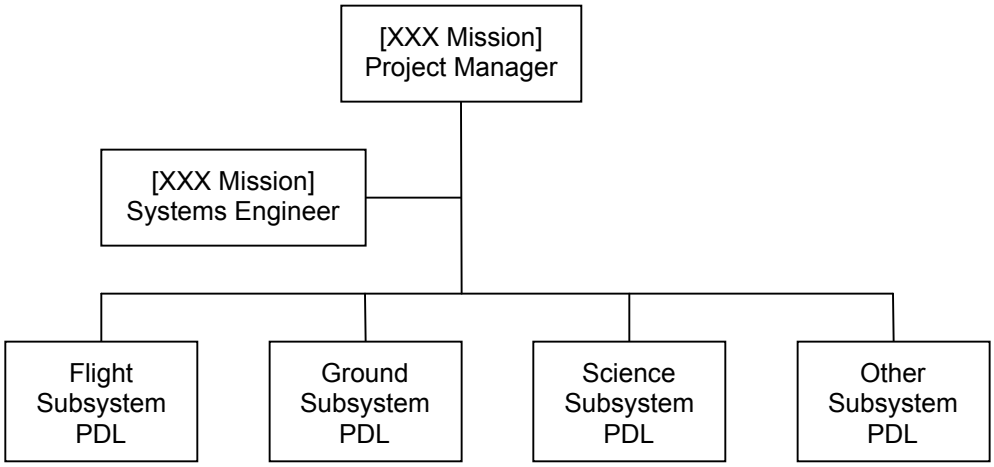
3.2 Resources Needed

[Indicate where the official budget is kept. In many cases, the budget will reside with the Project. Budget information should be kept by fiscal quarter, and shall include both civil servant staffing and any contractor support. Address any specific facilities or any facility modifications required for use in development or testing, and the dates they are expected to be required. List funding required for purchases identified in section 3.4, Procurement. Identify who is responsible for the budget. Note: The staffing budget shall be specified in civil servant and contractor full time equivalents (FTEs) separately. This data may also be specified in dollars ($). Since the dollar cost of staffing may be proprietary information for the contractor, the dollar cost may be kept separate to keep it from wide distribution. The budget should include the location of the documented estimates that are the basis for the budget.]

3.3 PDT Information

3.3.1 Organization

[Include an explanation or diagram illustrating the organization of the PDT personnel and its activities. Include the relationship of the Product Development Lead (PDL) to the higher-level Project organization for status and accountability, if applicable. Use the following diagram to show organizational relationships and modify to fit the project.]



3.3.2 Roles, Responsibilities, Authority, and Accountability

[Describe the Work Breakdown Structure (WBS) used to assign work to PDT members and document the work assignments. Assignments may be made by subsystem (e.g., Command and Data Handling, Planning and Scheduling) or by work function (e.g., testing). Include any time constraints or interface boundaries within which this PDT is expected to operate.]

3.3.3 Interfaces to Other Teams, Organizations, or Groups

[Describe any interfaces to other organizations, teams, or groups necessary in developing the product. Provide a brief description of the purpose of each interface, who is responsible on the PDT, and who is the person responsible on the other organization, team, or group. This may include but is not limited to activities such as the interface of the PDT:

- *to the hardware group for working design/compatibility issues*
- *to the main system software for acceptance of the system*
- *to relevant research groups*
- *to Software Quality Assurance, Code 300*
- *to Configuration Management, (if not done internally within PDT), etc.]*

Interface Name and Brief Description	PDT Person Responsible	Org. Person Responsible

3.3.4 Training Plan

[Identify any required task-specific training need for each PDT member. When training is complete, document it by keeping a list of name, course, and date completed. (QMS required task-specific training is defined as training that must be taken to acquire new skills or enhance current skills required to perform tasks of that position that affect quality. This includes familiarizing PDT members with the SMP/PP, the methodology, standards, and design process used, the team records, and use of a nonconformance recording system. It does not include general purpose "developmental" training (e.g., in a software language or tool not specific to this project).]

PDT Member	Required Training Course	Date Completed

3.4 Procurement

[Reference all hardware and software purchase requirements in detail (e.g., the specifications for a product to be acquired). If a reference is not available, then describe these items here. Include any purchases necessary for facility modification. If you are using contractor support, list the contractor name and contract number. If special or unusual contracting arrangements are required, describe them. Reference the procurement process to be used. See Procurement, GPR 5100.1e at http://gdms.gsfc.nasa.gov/gdmsnew/home.jsp, for a detailed description.]

3.5 Risk Management

[Describe any areas where there is a special risk to the delivery of the product and describe how these risks will be continuously identified, analyzed planned for, and tracked. The NASA process and resources for Continuous Risk Management is discussed in detail in NPR 7120.5, "NASA Program and Project Management Processes and Requirements", which can be found at http://nodis.hq.nasa.gov/. If risks are described in a separate document, reference the document here. If there are no risks, state that fact.]

3.6 Software Safety

[Describe the plans for implementing software safety standard if any part of the software produced by this software project is identified as safety critical. Software safety analysis verifies that the software contains no errors or deficiencies that could contribute to risks to people or property. If there is no software produced that is identified as safety critical, then state that.

See NASA-STD 8719.13B, the NASA Software Safety Standard and NASA-GB-8719.13 the NASA Software Safety Guidebook, for details. The guidebook is designed to help create a set of tailored activities and analyses that will meet the requirements of the Software Safety Standard. Both can be found at http://www.hq.nasa.gov/office/codeq/software/docs.htm.]

3.7 Software Security

[Describe the plans for implementing software security for the project. See NPR 2810.1, Security of Information Technology, Appendix A, located at http://nodis.hq.nasa.gov/ for more details.

The project manager is responsible for requirements associated with the

- *Security of people and NASA assets*
- *Security of information technology*
- *Proper export of controlled hardware, technology, and data (including software)*
- *Involvement of partners, contractors, and citizens of foreign countries]*

3.8 Review Program

[Describe the types of reviews you plan to have and the membership of the review boards. The review types should include status and progress reviews in addition to product reviews. The PDL shall define, with the participation of the project manager, line management and the customer, an appropriate set of software reviews as a resource to increase the probability of success for this class of project. Reviews may be combined to improve value or efficiency. However, when reviews are combined, review objectives from each shall be addressed to the level of detail required for the individual reviews. In addition include a discussion of any code or design walkthroughs you plan to use. Examples of some possible product review types include SCR, SRR, SSR, PDR, CDR, ATRR, ORR, and Software Peer Reviews.]

3.9 Overall Schedule

[This section should reference the overall schedule used to manage PDT activities. If a reference is not available, then list these items here. It should contain the PDT lifecycle schedule including facility preparations, procurements, system development by phase and build/release, product delivery, and maintenance (if applicable). Be sure to include schedule dates for reviews, documentation, delivery of interface control documents (ICDs), tests, software releases, procurements, external deliveries to the customer, support services and process events. The detailed schedule should include and be consistent with any customer-specified schedules defined in Section 2.4. Provide as a minimum a high-level summary of the milestones in the plan if the detailed schedule is referenced elsewhere.]

3.10 Status Tracking

[Describe the method(s) that will be used to track status through design, implementation, and testing of the product. Status is assessed by the PDL. This may include:

- *Module status checklists*
- *Test status matrices*
- *Configuration management status reports*
- *Status reports from the Discrepancy or Change Reporting system*
- *Staffing*
- *Earned-value reports (i.e., point counting)*
- *CMMI compliance status, etc.]*

3.11 Metrics Collection and Analysis

[Describe the metrics that the project will collect and the analysis required for the data.

The recommended set of metrics includes: schedule, budget (effort and/or cost), product size, product error information such as the number of open/closed non-conformances, and number of open/closed action items. Other metrics may be collected to satisfy project-specific needs or goals. See the ISD Measurement Program, http://software.gsfc.nasa.gov/metrics.htm for more detailed information.

List the project's specific measurement objectives and the metrics that will be collected to satisfy these objectives. Identify how metrics will be collected, stored, and analyzed. Describe how you will use these metrics for product and process improvement.]

3.12 Lessons Learned

[Describe the process to be followed to ensure capture by the PDT of relevant lessons learned throughout the entire life cycle. Use or modify the following process steps:]

- The PDL will query the NASA Lessons Learned Information System (which is maintained at http://llis.nasa.gov) and other knowledge resources at the beginning and then episodically throughout the software development lifecycle, as appropriate, to access relevant past experiences and knowledge that can be leveraged to reduce risk, improve quality and efficiency.
- The PDL will consider any significant lessons learned for inclusion in LLIS and submit those lessons, if appropriate.
- The PDL will document final lessons learned and submit them to http://software.gsfc.nasa.gov. Lessons Learned are intended to be a brief summary of the PDT's key recommendations for improving the development/maintenance process in future similar projects.

4.0 Software Technical Approach

4.1 Derived Requirements

[This section should reference (preferred) or list all the assumptions, constraints, interfaces, and performance required for the software. Ensure that requirements are testable. This does not include those Customer Requirements stated in Section 2.3.]

4.2 Development Strategy

4.2.1 Development Process

[Describe at a high-level the lifecycle and development process you will use. Tailor standard GSFC processes for software development or maintenance, as necessary.

The GSFC Process Asset Library at http://software.gsfc.nasa.gov is the repository for standard ISD and Branch-tailored processes and procedures. Tailoring is determined by the PDL with the concurrence of the project manager, line management and the customer (typically a project manager or principal investigator). Tailoring factors include project characteristics such as the criticality of the application, the size of the Product Development Team (PDT) and user community, the degree of reuse, and other project specific factors. Required activities are designated as "shall" and may not be deleted. Best practices from past experience are designated as "recommended" and should be thoughtfully considered for adoption by the PDL.]

4.2.2 Development Environment

[Describe the development and test hardware and locations, and all PDT development standards, as appropriate. Describe plans (such as back-ups) to prevent loss or damage to all of the products (including software, documentation and hardware) during all phases of development.]

4.2.3 Buy Approach

[Reference any special purchasing strategies for items specified in Section 3.4. If a reference is not available, then describe these items here. This may include strategies for use of COTS such as agreements for vendor modifications to address specific requirements. Note that in most cases, open competitive procurement of hardware and software products is required. See Procurement, GPR 5100.1e at http://gdms.gsfc.nasa.gov/gdmsnew/home.jsp, for a detailed description.]

4.2.4 Prototyping

[Describe any prototyping activities required to develop the product and the purpose of the prototype, e.g., "What specific questions are answered by the prototype?".]

4.3 Product Design

[Reference the design of the product the PDT is planning to produce. If a reference is not available, then briefly describe these items here. Describe how changes in design are incorporated and traced to changes in the requirements. Describe how the design will be traced to the customer-specified and derived requirements/specifications (Sections 2.3 and 4.1, respectively).]

4.4 Build Approach

[Briefly describe your build approach including:

- *the development phases*
- *the sequence of builds*
- *vendor/customer/ prototype elements to be integrated*
- *the requirements satisfied in each build*
- *verification and validation methods*
- *provide specific reference to any planned Build Plan document]*

4.5 Product Testing

[Briefly describe your testing approach for unit, build/release, system, and acceptance testing; type and number of inspections (e.g., design inspections, code inspections); the composition of the test team (developers, independent, customer); test data (simulator, supplied data, hardware, real data); and any related success criteria (particularly any from the customer for final acceptance—see Section 2.6). Describe how changes in requirements and design are mapped to changes in test plans. Reference specific Test Plans and Results documentation to be developed.

4.6 Configuration Management

[Describe your overall approach to configuration management (CM). Describe how your PDT does CM for your software, hardware and documentation and who has the change authority for each, including identification of any CCB's and the items controlled. If you use the Project's process for any of those, reference where their procedures can be found. Describe the signature and change authority for the SMP/PP. Describe the method used to uniquely identify versions of the software and the elements from which it is built.

The use of a commercial CM tool is strongly recommended for environments where one is available. If on-line copies of documentation or software are considered the controlled copy, then the approval authority should control on-line change access. Identify who is responsible for performing the CM process.

Identify the types of documents that will be controlled and when each type will be placed under configuration control. A list of documents and data under CM by the PDT is to be referenced in the SMP/PP. The list is to include the document or database name, the date or version identification of the current version, the location of the documents or database, and the person responsible for the item.

Data and Documents	Database Name	Date or Version ID #	Location of Database	Person Responsible

NOTE: Any databases or web sites containing controlled information directly under the PDT's control should contain a header identifying what is being viewed, as well as the date of the last change and the person responsible for its control.]

4.7 Software Quality Assurance

[Describe your overall approach to software quality assurance (SQA). Describe the criteria and process for SQA. Specific project characteristics and risks influence assurance needs, and assurance planning should be tailored to reflect this fact. How will product evaluation and process monitoring be accomplished? What level of support will the project have from the center SQA organization, Code 300?

Characteristics that should be considered include safety and mission criticality of the software, schedule and budget, size and complexity of the product to be produced, and size and organizational complexity of the development staff. Consider documentation standards, design standards, and code standards as well for inclusion in project standards.

For additional information, see the NASA Software Assurance Standard, NASA-STD-8739.8, and the NASA Software Assurance Guidebook. Both of these documents can be found at http://www.hq.nasa.gov/office/codeq/software/docs.htm

4.8 Software Maintenance

[Briefly describe the process for hand-off of the completed products to the maintenance team. Identify who will be responsible for the hand-off. If the development team is to perform maintenance, then state that fact.

Reference (preferred) the Software Maintenance Management Plan (SMMP) that will be implemented. If there is no SMMP at this point, state that fact.]

Appendix A: Acronyms

ATRR	Acceptance Test Readiness Review
CCB	Configuration Control Board
CDR	Critical Design Review
CM	Configuration Management
COTS	Commercial Off The Shelf
FTE	Full Time Equivalent
GPR	GSFC Procedural Requirements
GSFC	Goddard Space Flight Center
ICD	Interface Control Document
ISO	International Standards Organization
LLIS	Lessons Learned Information System
NASA	National Aeronautics and Space Administration
NPR	NASA Procedural Requirements
ORR	Operational Readiness Review
PDL	Product Development Lead
PDR	Preliminary Design Review
PDT	Product Development Team
QMS	Quality Management System
SCR	System Concept Review
SMMP	Software Maintenance Management Plan
SMP/PP	Software Management Plan / Product Plan
SQA	Software Quality Assurance
SRR	System Requirements Review
SSR	Software Specifications Review
WBS	Work Breakdown Structure